

CLAIMS:

1. A correlated set of individually numbered golf club irons having heads progressing from a high numbered head to a low numbered head; individual heads having a front striking face, a sole, a toe, and a heel; the front striking faces of heads within the set individually having a planar area defining a progressively decreasing loft angle in going from the high numbered head to the low numbered head, the planar area having a top and a bottom, individual front striking faces having a series of grooves of a common cross sectional shape from the top to the bottom; for at least two chosen pairs of heads within the set, the grooves being configured to provide decreasing golf ball spin in going from the lower numbered head to the higher numbered head in the pair if the golf ball were hit by the faces by identical impacts at the same loft angle.

2. The correlated set of individually numbered golf club irons of claim 1 wherein the individual grooves have a base and opposing sidewalls which diverge from the base and extend outwardly in the direction of the front striking face, the sidewalls comprising opposing protrusions extending into the groove proximate the front striking face, the respective opposing sidewall protrusions extending inwardly from its sidewall to an apex which is displaced inwardly from the sidewall.

1 3. The correlated set of individually numbered golf club irons of
2 claim 1 wherein the individual grooves have a base and opposing sidewalls
3 which diverge from the base and extend outwardly in the direction of the
4 front striking face, the sidewalls comprising opposing protrusions extending into
5 the groove proximate the front striking face, the respective opposing sidewall
6 protrusions extending inwardly from its sidewall to an apex which is displaced
7 inwardly from the sidewall, the apex displacement from the sidewall being
8 different for the higher numbered head and the lower numbered head in the
9 pair.

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11 4. The correlated set of individually numbered golf club irons of
12 claim 3 wherein the apex displacement from the sidewall is less for the
13 lower numbered head than for the higher numbered head in the pair.

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15 5. The correlated set of individually numbered golf club irons of
16 claim 3 wherein the apex displacement from the sidewall is less for the
17 higher numbered head than for the lower numbered head in the pair.

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19 6. The correlated set of individually numbered golf club irons of
20 claim 3 wherein the respective opposing sidewall protrusions comprise a
21 curved outer surface which starts from the front striking face.
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1 7. The correlated set of individually numbered golf club irons of
2 claim 1 wherein the individual grooves have a base and opposing sidewalls
3 which diverge from the base and extend outwardly in the direction of the
4 front striking face, the sidewalls comprising opposing protrusions extending into
5 the groove proximate the front striking face, the respective opposing sidewall
6 protrusions having an outer surface characterized by a substantially constant
7 radius of curvature, the radius of curvature being greater for the higher
8 numbered head than for the lower numbered head in the pair.

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10 8. The correlated set of individually numbered golf club irons of
11 claim 7 wherein the radius of curvature is defined from an origin received
12 outwardly of the respective sidewall.

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14 9. The correlated set of individually numbered golf club irons of
15 claim 1 wherein the individual grooves have a base and opposing sidewalls
16 which diverge from the base and extend outwardly in the direction of the
17 front striking face, and define a symmetrical groove cross section; the base
18 comprising a protrusion extending in the direction of the front striking face,
19 the base protrusion having an apex received inwardly of the front striking
20 face.

1 10. The correlated set of individually numbered golf club irons of
2 claim 1 wherein the individual grooves have a base and opposing sidewalls
3 which diverge from the base and extend outwardly in the direction of the
4 front striking face, and define a symmetrical groove cross section; the base
5 comprising a protrusion extending in the direction of the front striking face,
6 the base protrusion having an apex received inwardly of the front striking
7 face; the apex being displaced inwardly of the front striking face a greater
8 amount in the higher numbered head compared to the lower numbered head
9 in the pair.

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11 11. The correlated set of individually numbered golf club irons of
12 claim 1 wherein,

13 the individual grooves have a base and opposing sidewalls which
14 diverge from the base and extend outwardly in the direction of the front
15 striking face, the sidewalls comprising opposing protrusions extending into the
16 groove proximate the front striking face, the respective opposing sidewall
17 protrusions extending inwardly from its sidewall to an apex which is displaced
18 inwardly from the sidewall; and

19 the groove base and sidewalls define a symmetrical groove cross
20 section; the base comprising a protrusion extending in the direction of the
21 front striking face, the base protrusion having an apex received inwardly of
22 the front striking face.

1 12. The correlated set of individually numbered golf club irons of
2 claim 1 wherein,

3 the individual grooves have a base and opposing sidewalls which
4 diverge from the base and extend outwardly in the direction of the front
5 striking face, the sidewalls comprising opposing protrusions extending into the
6 groove proximate the front striking face, the respective opposing sidewall
7 protrusions extending inwardly from its sidewall to an apex which is displaced
8 inwardly from the sidewall;

9 the groove base and sidewalls define a symmetrical groove cross
10 section; the base comprising a protrusion extending in the direction of the
11 front striking face, the base protrusion having an apex received inwardly of
12 the front striking face; and

13 the set being characterized by at least one of (A) and (B) as follows:

14 (A): the sidewall protrusion apex displacements from the respective
15 sidewalls being different for the higher numbered head and the
16 lower numbered head in the pair;

17 (B): the base protrusion apex being displaced inwardly of the front
18 striking face a greater amount in the lower numbered head
19 compared to the higher numbered head in the pair.

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21 13. The correlated set of individually numbered golf club irons of
22 claim 12 characterized by both (A) and (B),
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1 14. A golf club iron head comprising a front striking face, a sole,
2 a toe, and a heel; the front striking face having a planar area having a top
3 and a bottom; the front striking face having a series of grooves of a
4 common cross sectional shape from the top to the bottom; individual grooves
5 having a base and opposing sidewalls which diverge from the base and extend
6 outwardly in the direction of the front striking face, the sidewalls comprising
7 opposing protrusions extending into the groove proximate the front striking
8 face.

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10 15. The golf club iron head of claim 14 wherein the base includes
11 a flat portion.

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13 16. The golf club iron head of claim 14 wherein the opposing
14 sidewall protrusions are of the same shape and size.

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16 17. The golf club iron head of claim 14 wherein the respective
17 opposing sidewall protrusions have a topmost portion which starts projecting
18 into the groove from the front striking face.

1 18. The golf club iron head of claim 14 wherein the respective
2 opposing sidewall protrusions have a bottommost portion which starts projecting
3 into the groove from its sidewall, the opposing sidewalls extending straight
4 linear from proximate the base outwardly to proximate the bottommost portions
5 of the opposing sidewall protrusions.

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7 19. The golf club iron head of claim 14 wherein the respective
8 sidewall protrusions project inwardly from the sidewall to an apex which is
9 at least 0.0001 from the sidewall.

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11 20. The golf club iron head of claim 14 wherein the respective
12 opposing sidewall protrusions have a largely semicircular outer surface.

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14 21. The golf club iron head of claim 14 wherein the respective
15 sidewall protrusions project inwardly from the sidewall to an apex defined on
16 a sidewall protrusion surface which is curved.

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18 22. The golf club iron head of claim 21 wherein the respective
19 sidewall protrusion surfaces are formed about a respective substantially constant
20 radius of curvature.

1 23. The golf club iron head of claim 21 wherein the respective
2 sidewall protrusion surfaces are formed about a respective substantially constant
3 radius of curvature defined from an origin received outwardly of the
4 respective sidewall.

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6 24. The golf club iron head of claim 21 wherein each sidewall
7 protrusion surface is formed about a substantially constant radius of curvature
8 which is the same for each sidewall protrusion surface.

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10 25. The golf club iron head of claim 21 wherein each sidewall
11 protrusion surface is formed about a substantially constant radius of curvature
12 which is the same for each sidewall protrusion surface and from an origin
13 received outwardly of the respective sidewall.

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15 26. The golf club iron head of claim 14 wherein the respective
16 opposing sidewall protrusions project inwardly from the sidewall to an apex
17 which is displaced inwardly from the front striking face.

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19 27. The golf club iron head of claim 14 wherein the groove base
20 and sidewalls define a symmetrical groove cross section; the base comprising
21 a protrusion extending in the direction of the front striking face, the base
22 protrusion having an apex received inwardly of the front striking face.

1 28. A correlated set of individually numbered golf club irons having
2 heads progressing from a high numbered head to a low numbered head;
3 individual heads having a front striking face, a sole, a toe, and a heel; the
4 front striking faces of heads within the set individually having a planar area
5 defining a progressively decreasing loft angle in going from the high
6 numbered head to the low numbered head, individual grooves having a base
7 and opposing sidewalls which diverge from the base and extend outwardly in
8 the direction of the front striking face, the sidewalls comprising opposing
9 protrusions extending into the groove proximate the front striking face; for at
10 least two chosen pairs of heads within the set, the sidewall protrusions
11 extending laterally further into the grooves in the higher numbered head
12 compared to the lower numbered head in the pair.

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14 29. The correlated set of individually numbered golf club irons of
15 claim 28 wherein the respective opposing sidewall protrusions comprise a
16 curved outer surface which starts from the front striking face.

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18 30. The correlated set of individually numbered golf club irons of
19 claim 28 wherein the respective opposing sidewall protrusions comprise a
20 curved outer surface which starts from the front striking face and curves
21 continuously to its sidewall.
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1 31. The correlated set of individually numbered golf club irons of
2 claim 28 wherein the respective sidewall protrusions project inwardly from the
3 sidewall to an apex defined on a sidewall protrusion surface which is curved.

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5 32. The correlated set of individually numbered golf club irons of
6 claim 31 wherein the sidewall protrusion surfaces for each head within the
7 set are formed about a respective substantially constant radius of curvature
8 which is the same for each sidewall protrusion surface for the head.

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10 33. The correlated set of individually numbered golf club irons of
11 claim 31 wherein the sidewall protrusion surfaces for each head within the
12 set are formed about a respective substantially constant radius of curvature
13 which is the same for each sidewall protrusion surface for the head, and
14 different radii of curvature for the pair.

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16 34. The correlated set of individually numbered golf club irons of
17 claim 33 wherein the radius of curvature is greater in the higher numbered
18 head compared to the lower numbered head in the pair.

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1 35. A correlated set of individually numbered golf club irons having
2 heads progressing from a high numbered head to a low numbered head;
3 individual heads having a front striking face, a sole, a toe, and a heel; the
4 front striking faces of heads within the set individually having a planar area
5 defining a progressively decreasing loft angle in going from the high
6 numbered head to the low numbered head, individual grooves having a base
7 and opposing sidewalls which diverge from the base and extend outwardly in
8 the direction of the front striking face, the sidewalls comprising opposing
9 protrusions extending into the groove proximate the front striking face; for at
10 least two chosen pairs of heads within the set, the sidewall protrusions
11 extending laterally further into the grooves in the lower numbered head
12 compared to the higher numbered head in the pair.

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14 36... The correlated set of individually numbered golf club irons of
15 claim 35 wherein the respective opposing sidewall protrusions comprise a
16 curved outer surface which starts from the front striking face.

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18 37. The correlated set of individually numbered golf club irons of
19 claim 35 wherein the respective opposing sidewall protrusions comprise a
20 curved outer surface which starts from the front striking face and curves
21 continuously to its sidewall.
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1 38. The correlated set of individually numbered golf club irons of
2 claim 35 wherein the respective sidewall protrusions project inwardly from the
3 sidewall to an apex defined on a sidewall protrusion surface which is curved.
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5 39. The correlated set of individually numbered golf club irons of
6 claim 38 wherein the sidewall protrusion surfaces for each head within the
7 set are formed about a respective substantially constant radius of curvature
8 which is the same for each sidewall protrusion surface for the head.
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10 40. The correlated set of individually numbered golf club irons of
11 claim 38 wherein the sidewall protrusion surfaces for each head within the
12 set are formed about a substantially constant radius of curvature which is the
13 same for each sidewall protrusion surface for the head and for the pair.
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15 41. A golf club iron head comprising a front striking face, a sole,
16 a toe, and a heel; the front striking face having a planar area having a top
17 and a bottom; the front striking face having a series of grooves of a
18 common cross sectional shape from the top to the bottom; individual grooves
19 having a base and opposing sidewalls which diverge from the base and extend
20 outwardly in the direction of the front striking face, and define a symmetrical
21 groove cross section; the base comprising a protrusion extending in the
22 direction of the front striking face, the base protrusion having an apex
23 received inwardly of the front striking face.
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1 42. The golf club iron head of claim 41 wherein the base comprises
2 only a single protrusion.
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4 43. The golf club iron head of claim 41 wherein the base protrusion
5 has opposing base walls which converge in the direction of the apex.
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7 44. The golf club iron head of claim 41 wherein the apex is defined
8 on a base protrusion surface which is curved.
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10 45. The golf club iron head of claim 44 wherein the outermost
11 surface has a substantially constant radius of curvature.
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13 46. The golf club iron head of claim 44 wherein the outermost
14 surface has a substantially constant radius of curvature which is defined from
15 an origin received outwardly of the respective sidewall.
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17 47. The golf club iron head of claim 41 wherein the apex is at
18 least 0.001 inch inwardly of the front striking face.
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20 48. The golf club iron head of claim 41 wherein the apex is no
21 more than 0.018 inch inwardly of the front striking face.
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1 49. The golf club iron head of claim 41 wherein the apex is at
2 least 0.001 inch inwardly of the front striking face, and no more than 0.018
3 inch inwardly of the front striking face.

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5 50. The golf club iron head of claim 41 wherein the base includes
6 a flat portion.

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8 51. The golf club iron head of claim 41 wherein the apex is
9 centrally located between the sidewalls.

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11 52. The golf club iron head of claim 41 wherein the base protrusion
12 has opposing base walls, and variable width between the groove sidewalls.

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14 53. The golf club iron head of claim 41 wherein the base protrusion
15 has opposing base walls, and continuously variable width between the groove
16 sidewalls.

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18 54. The golf club iron head of claim 41 wherein the base protrusion
19 has opposing base walls, and a minimum width between the groove sidewalls
20 of from 0.001 inch to 0.025 inch.

1 55. The golf club iron head of claim 41 wherein the base protrusion
2 has opposing base walls, variable width between the groove sidewalls, and a
3 minimum width between the groove sidewalls of from 0.001 inch to 0.025
4 inch.

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6 56. The golf club iron head of claim 41 wherein the base protrusion
7 has opposing base walls, continuously variable width between the groove
8 sidewalls, and a minimum width between the groove sidewalls of from 0.001
9 inch to 0.025 inch.
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1 57. A correlated set of individually numbered golf club irons having
2 heads progressing from a high numbered head to a low numbered head;
3 individual heads having a front striking face, a sole, a toe, and a heel; the
4 front striking faces of heads within the set individually having a planar area
5 defining a progressively decreasing loft angle in going from the high
6 numbered head to the low numbered head, individual grooves having a base
7 and opposing sidewalls which diverge from the base and extend outwardly in
8 the direction of the front striking face, and define a symmetrical groove cross
9 section; the base comprising a protrusion extending in the direction of the
10 front striking face, the base protrusion having an apex received inwardly of
11 the front striking face; for at least two chosen pairs of heads within the set,
12 the apex being displaced inwardly of the front striking face a greater amount
13 in the higher numbered head compared to the lower numbered head in the
14 pair.

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16 58. The correlated set of individually numbered golf club irons of
17 claim 57 wherein the respective base protrusions have opposing base walls
18 which converge in the direction of the apex.

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20 59. The correlated set of individually numbered golf club irons of
21 claim 57 wherein the respective apexes are defined on a base protrusion
22 surface which is curved.
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1 60. The correlated set of individually numbered golf club irons of
2 claim 57 wherein the respective apexes are centrally located between the
3 sidewalls.

4
5 61. A method of matching a golf club to a golfer comprising:
6 manufacturing an inventory array of golf clubs of a given number golf
7 club head, individual heads comprising a front striking face, a sole, a toe,
8 and a heel; the front striking face having a top and a bottom, the front
9 striking face of individual heads having a series of grooves of a common
10 cross sectional shape from the top to the bottom, the golf club heads of the
11 golf clubs of the inventory array being characterized at least by at least two
12 different groove designs in the front striking face;

13 considering an attribute of a golfer's golf game; and

14 selecting a golf club of the number for the golfer from the inventory
15 array based at least in part on the considered attribute in relation to groove
16 design within the inventory array.

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18 62. The method of claim 61 wherein the attribute comprises the
19 golfer's swing.

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21 63. The method of claim 61 wherein the attribute comprises a visual
22 perception of the golfer's swing.

1 64. The method of claim 61 wherein the attribute comprises the
2 golfer's handicap.

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4 65. A method of matching a set of golf clubs to a golfer
5 comprising:

6 manufacturing an inventory array of golf club sets having individually
7 numbered golf club heads progressing from a high numbered head to a low
8 numbered head, individual heads comprising a front striking face, a sole, a
9 toe, and a heel; the front striking face having a top and a bottom, the front
10 striking face of individual heads having a series of grooves of a common
11 cross sectional shape from the top to the bottom, the golf club sets of the
12 inventory array being characterized at least by at least two different groove
13 designs in the front striking face in at least one of the same number heads
14 between at least two of the sets;

15 considering an attribute of a golfer's golf game; and

16 selecting a golf club set for the golfer from the inventory array based
17 at least in part on the considered attribute in relation to groove design within
18 the inventory array.

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20 66. The method of claim 65 wherein the attribute comprises the
21 golfer's swing.

1 67. The method of claim 65 wherein the attribute comprises a visual
2 perception of the golfer's swing.

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4 68. The method of claim 65 wherein the attribute comprises the
5 golfer's handicap.
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